

CLAIMS

What is claimed is:

1. A method for determining Global Positioning System (GPS) time in a mobile terminal camped on a first control channel from which a relationship to GPS time is unavailable, comprising:
 - switching from the first control channel to a second control channel from which a relationship to GPS time is available;
 - acquiring the GPS time to second control channel time relationship; and
 - determining the GPS time using the relationship.
2. The method of claim 1 further comprising:
 - switching, after acquiring the GPS time to second control channel time relationship, from the second control channel back to the first control channel.
3. The method of claim 1 wherein the second control channel is a digital control channel (DCCH) and the first control channel is an Enhanced General Packet Radio Service (EGPRS) packet control channel.
4. The method of claim 1 wherein the switching from the first control channel to a second control channel from which a relationship to GPS time is available comprises:
 - determining whether a preferred second control channel can be found, and
 - switching to the preferred second control channel when the preferred second control channel can be found.
5. The method of claim 4 wherein the switching from the first control channel to a second control channel from which a relationship to GPS time is available further comprises:
 - identifying a second control channel from a pointer list when the preferred second control channel cannot be found, and
 - switching to the identified second control channel from the pointer list.
6. The method of claim 1 further comprising:
 - acquiring time information associated with the second control channel.

7. The method of claim 6 wherein the determining the GPS time using the relationship comprises:

determining the GPS time using the relationship and the acquired time information.

8. The method of claim 1 further comprising:

determining, prior to the switching from the first control channel to a second control channel from which a relationship to GPS time is available, a time period on the second control channel that will contain the relationship.

9. The method of claim 8 wherein the switching from the first control channel to a second control channel from which a relationship to GPS time is available comprises:

switching from the first control channel to the second control channel just prior to an occurrence of the time period.

10. The method of claim 9 further comprising:

switching back to the first control channel after the occurrence of the time period.

11. The method of claim 1 wherein the acquiring the GPS time to second control channel time relationship comprises:

receiving the relationship in at least one broadcast message.

12. The method of claim 1 wherein the acquiring the GPS time to second control channel time relationship comprises:

receiving the relationship via point-to-point messaging.

13. The method of claim 1 wherein the switching from the first control channel to the second control channel occurs in response to at least one of a timeout signal and a position request.

14. A mobile terminal camped on a first control channel in a wireless communication system from which a relationship to Global Positioning System (GPS) time is unavailable, the mobile terminal comprising:

a memory that stores instructions; and

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a processor that executes the instructions to switch from the first control channel to a second control channel from which a relationship to GPS time is available, acquire the GPS time to second control channel time relationship from the second control channel, and determine GPS time using the relationship.

15. The mobile terminal of claim 14 wherein the processor switches, after acquiring the GPS time to second control channel time relationship, from the second control channel back to the first control channel.

16. The mobile terminal of claim 14 wherein the second control channel is a digital control channel (DCCH) and the first control channel is an Enhanced General Packet Radio Service (EGPRS) packet control channel.

17. The mobile terminal of claim 14 wherein, when switching from the first control channel to a second control channel from which a relationship to GPS time is available, the processor determines whether a preferred second control channel can be found, and switches to the preferred second control channel when the preferred second control channel can be found.

18. The mobile terminal of claim 17 wherein, when switching from the first control channel to a second control channel from which a relationship to GPS time is available, the processor identifies a second control channel from a pointer list when the preferred second control channel cannot be found, and switches to the identified second control channel from the
5 pointer list.

19. The mobile terminal of claim 14 wherein the processor acquires time information associated with the second control channel.

20. The mobile terminal of claim 19 wherein, when determining GPS time using the relationship, the processor determines the GPS time using the relationship and the acquired time information.

21. The mobile terminal of claim 14 wherein the processor determines, prior to the switching from the first control channel to a second control channel from which a relationship to

GPS time is available, a time period on the second control channel that will contain the relationship.

22. The mobile terminal of claim 21 wherein, when switching from the first control channel to a second control channel from which a relationship to GPS time is available, the processor switches from the first control channel to the second control channel just prior to an occurrence of the time period.

23. The mobile terminal of claim 22 wherein the processor switches back to the first control channel immediately after the occurrence of the time period.

24. The mobile terminal of claim 14 wherein, when acquiring the GPS time to second control channel time relationship, the processor receives the relationship in at least one broadcast message.

25. The mobile terminal of claim 14 wherein, when acquiring the GPS time to second control channel time relationship, the processor receives the relationship via point-to-point messaging.

26. The mobile terminal of claim 14 wherein, when switching from the first control channel to a second control channel from which a relationship to GPS time is available, the processor switches from the first control channel to the second control channel in response to at least one of a timeout signal and a position request.

27. A computer-readable medium containing instructions for controlling at least one processor to perform a method for determining Global Positioning System (GPS) time in a mobile terminal camped on a first control channel from which a relationship to GPS time is unavailable, the method comprising:

5 switching from the first control channel to a second control channel from which a relationship to GPS time is available;

 obtaining the GPS time to second control channel time relationship; and

 determining the GPS time using the relationship.

28. The computer-readable medium of claim 27 wherein the method further comprises:

switching, after obtaining the GPS time to second control channel time relationship, from the second control channel back to the first control channel.

29. The computer-readable medium of claim 27 wherein the second control channel is a digital control channel (DCCH) and the first control channel is an Enhanced General Packet Radio Service (EGPRS) packet control channel.

30. The computer-readable medium of claim 27 wherein the switching from the first control channel to a second control channel from which a relationship to GPS time is available comprises:

determining whether a preferred second control channel can be found, and
5 switching to the preferred second control channel when the preferred second control channel can be found.

31. The computer-readable medium of claim 30 wherein the switching from the first control channel to a second control channel from which a relationship to GPS time is available further comprises:

identifying a second control channel from a pointer list when the preferred second control channel cannot be found, and
5 switching to the identified second control channel from the pointer list.

32. The computer-readable medium of claim 27 wherein the method further comprises:

acquiring time information associated with the second control channel.

33. The computer-readable medium of claim 32 wherein the determining GPS time using the relationship comprises:

determining the GPS time using the relationship and the acquired time information.

34. The computer-readable medium of claim 27 wherein the method further comprises:

determining, prior to the switching from the first control channel to a second control channel from which a relationship to GPS time is available, a time period on the second control channel that will contain the relationship.

35. The computer-readable medium of claim 34 wherein the switching from the first control channel to a second control channel from which a relationship to GPS time is available comprises:

switching from the first control channel to the second control channel prior to an occurrence of the time period.

36. The computer-readable medium of claim 35 wherein the method further comprises:

switching back to the first control channel after the occurrence of the time period.

37. The computer-readable medium of claim 27 wherein the obtaining the GPS time to second control channel time relationship comprises:

receiving the relationship in at least one broadcast message.

38. The computer-readable medium of claim 27 wherein the obtaining the GPS time to second control channel time relationship comprises:

receiving the relationship via point-to-point messaging.

39. The computer-readable medium of claim 27 wherein the switching from the first control channel to a second control channel from which a relationship to GPS time is available occurs in response to at least one of a timeout signal and a position request.

40. A method for determining Global Positioning System (GPS) time in a mobile terminal camped on a first control channel, comprising:

transmitting a request for a GPS time to second control channel time relationship via the first control channel, the request specifying a second control channel with which the mobile terminal is associated;

receiving a value indicative of the relationship between GPS time and a time for the second control channel with which the mobile terminal is associated; and
determining the GPS time using the received value.

41. The method of claim 40 further comprising:
 - switching, prior to transmitting a request for a GPS time to second control channel time relationship via the first control channel, from the first control channel to the second control channel associated with the mobile terminal;
 - measuring a time on the second control channel; and
 - switching from the second control channel back to the first control channel.
42. The method of claim 41 wherein the determining GPS time using the received value comprises:
 - determining the GPS time using the received value and the measured time.
43. The method of claim 41 wherein the switching from the first control channel to the second control channel associated with the mobile terminal comprises:
 - determining whether a preferred second control channel can be found, and
 - switching to the preferred second control channel when the preferred second control channel can be found.
44. The method of claim 43 wherein the switching from the first control channel to the second control channel associated with the mobile terminal further comprises:
 - identifying a second control channel from a pointer list when the preferred second control channel cannot be found, and
 - switching to the identified second control channel from the pointer list.
45. The method of claim 40 wherein the transmitting a request for a GPS time to second control channel time relationship via the first control channel occurs in response to at least one of a timeout signal and a position request.
46. A mobile terminal tuned to a first control channel in a wireless communication network, comprising:
 - a memory that stores instructions; and

a processor that executes the instructions to transmit a request for a Global Positioning System (GPS) time to second control channel time relationship via the first control channel, the request specifying a second control channel with which the mobile terminal is associated, receive a value indicative of the relationship between GPS time and a time for the second control channel, and determine GPS time using the received value.

47. The mobile terminal of claim 46 wherein the processor:
switches, prior to the transmitting a request for a GPS time to second control channel time relationship via the first control channel, from the first control channel to the second control channel associated with the mobile terminal,

5 acquires time information associated with the second control channel, and switches from the second control channel back to the first control channel.

48. The mobile terminal of claim 47 wherein, when determining GPS time using the received value, the processor determines the GPS time using the received value and the acquired time information.

49. The mobile terminal of claim 47 wherein, when switching from the first control channel to the second control channel associated with the mobile terminal, the processor determines whether a preferred second control channel can be found, and switches to the preferred second control channel when the preferred second control channel can be found.

50. The mobile terminal of claim 49 wherein, when switching from the first control channel to the second control channel associated with the mobile terminal, the processor identifies a second control channel from a pointer list when the preferred second control channel cannot be found, and switches to the identified second control channel from the pointer list.

51. The mobile terminal of claim 46 wherein, when transmitting a request for a GPS time to second control channel time relationship via the first control channel, the processor transmits the request in response to at least one of a timeout signal and a position request.

52. A computer-readable medium containing instructions for controlling at least one processor to perform a method for determining Global Positioning System (GPS) time in a mobile terminal tuned to a first control channel, comprising:

transmitting a request for a GPS time to second control channel time relationship
5 via the first control channel, the request identifying a second control channel with which the mobile terminal is associated;
receiving a value indicative of the relationship between GPS time and a time for the second control channel; and
determining the GPS time using the received value.

53. The computer-readable medium of claim 52 wherein the method further comprises:

switching, prior to the transmitting a request for a GPS time to second control channel time relationship via the first control channel, from the first control channel to the second control channel;
5 acquiring a time associated with the second control channel; and
switching from the second control channel back to the first control channel.

54. The computer-readable medium of claim 53 wherein the determining the GPS time using the received value comprises:

determining the GPS time using the received value and the acquired time.

55. The computer-readable medium of claim 53 wherein the switching from the first control channel to the second control channel comprises:

determining whether a preferred second control channel can be found, and
switching to the preferred second control channel when the preferred second control channel can be found.
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56. The computer-readable medium of claim 55 wherein the switching from the first control channel to the second control channel further comprises:

identifying a second control channel from a pointer list when the preferred second control channel cannot be found, and
switching to the identified second control channel from the pointer list.
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57. The computer-readable medium of claim 52 wherein the transmitting a request for a GPS time to second control channel time relationship via the first control channel occurs in response to at least one of a timeout signal and a position request.

58. A method for performing a position fix by a mobile terminal camped on a packet control channel, comprising:

transmitting a request for Global Positioning System (GPS) assistance data via the packet control channel;

5 receiving the requested assistance data; and

performing the position fix using the received assistance data.

59. The method of claim 58 further comprising:

switching, prior to the transmitting a request for GPS assistance data via the packet control channel, from the packet control channel to a non-packet control channel;

acquiring time information associated with the non-packet control channel; and

5 switching from the non-packet control channel back to the packet control channel.

60. The method of claim 58 wherein the GPS assistance data comprises at least one of Almanac data, ephemeris and clock corrections data, reference time data, reference location data, and a GPS time to non-packet control time relationship.

61. A mobile terminal camped on a packet control channel in a wireless communication network, comprising:

a memory that stores instructions; and

a processor that executes the instructions to send a request for Global Positioning

5 System (GPS) assistance data via the packet control channel, receive the requested assistance data, and perform a position fix using the received assistance data.

62. The mobile terminal of claim 61 wherein the processor:

switches, prior to the sending a request for GPS assistance data via the packet control channel, from the packet control channel to a non-packet control channel,

acquires time information associated with the non-packet control channel, and

5 switches from the non-packet control channel back to the packet control channel.

63. The mobile terminal of claim 62 wherein, when performing the position fix using the received assistance data, the processor performs a position fix using the GPS assistance data and the acquired time information.

64. The mobile terminal of claim 61 wherein the GPS assistance data comprises at least one of Almanac data, ephemeris and clock corrections data, reference time data, reference location data, and a GPS time to non-packet control time relationship.

65. A computer-readable medium containing instructions for controlling at least one processor to perform a method for performing a position fix by a mobile terminal camped on a packet control channel, the method comprising:

transmitting a request for Global Positioning System (GPS) assistance data via the
5 packet control channel;

receiving the requested assistance data; and

performing the position fix using the received assistance data.

66. The computer-readable medium of claim 65, wherein the method further comprises:

switching, prior to the transmitting a request for GPS assistance data via the
packet control channel, from the packet control channel to a non-packet control channel;

5 acquiring time information associated with the non-packet control channel; and

switching from the non-packet control channel back to the packet control channel.

67. The computer-readable medium of claim 66 wherein the performing the position fix using the received GPS assistance data comprises:

performing the position fix using the GPS assistance data and the acquired time
information.

68. The computer-readable medium of claim 65 wherein the GPS assistance data comprises at least one of Almanac data, ephemeris and clock corrections data, reference time data, reference location data, and a GPS time to non-packet control time relationship.

69. A method for performing a positioning fix by a mobile terminal tuned to a first control channel, comprising:

receiving a position request;

switching from the first control channel to a second control channel;

5 acquiring Global Positioning System (GPS) assistance data via the second control channel; and
 performing the positioning fix using the acquired GPS assistance data.

70. The method of claim 69 wherein the GPS assistance data comprises at least one of Almanac data, ephemeris and clock corrections data, reference time data, reference location data, and a relationship between GPS time and time on the second control channel.

71. The method of claim 69 further comprising:
 determining, prior to switching from the first control channel to the second control channel, a time period on the second control channel that will contain the GPS assistance data.

72. The method of claim 71 wherein the switching from the first control channel to the second control channel comprises:

 switching from the first control channel to the second control channel prior to an occurrence of the time period.

73. The method of claim 72 further comprising:
 switching back to the first control channel after the occurrence of the time period.

74. The method of claim 69 wherein the acquiring GPS assistance data via the second control channel comprises:

 receiving the GPS assistance data in at least one broadcast message.

75. The method of claim 69 wherein the acquiring GPS assistance data via the second control channel comprises:

 obtaining the GPS assistance data via point-to-point messaging.

76. A mobile terminal comprising:
 a memory that stores instructions; and
 a processor that executes the instructions to receive a position request, switch from a first control channel to a second control channel, acquire Global Positioning System (GPS) assistance data via the second control channel, and perform a positioning fix using the acquired GPS assistance data.

77. The mobile terminal of claim 76 wherein the GPS assistance data comprises at least one of one or more of Almanac data, ephemeris and clock corrections data, reference time data, reference location data, and a relationship between GPS time and time on the second control channel.

78. The mobile terminal of claim 76 wherein the processor determines, prior to switching from the first control channel to the second control channel, a time period on the second control channel that will contain the GPS assistance data.

79. The mobile terminal of claim 78 wherein, when switching from the first control channel to the second control channel, the processor switches from the first control channel to the second control channel just prior to an occurrence of the time period.

80. The mobile terminal of claim 79 wherein the processor switches back to the first control channel immediately after the occurrence of the time period.

81. The mobile terminal of claim 76 wherein, when acquiring GPS assistance data via the second control channel, the processor receives the GPS assistance data via at least one of broadcast messaging and point-to-point messaging.

82. A computer-readable medium containing instructions for controlling at least one processor to perform a method for performing a positioning fix by a mobile terminal camped on a first control channel, the method comprising:

5 receiving a position request;
switching from the first control channel to a second control channel;
acquiring Global Positioning System (GPS) assistance data via the second control channel, the GPS assistance data comprising at least one of Almanac data, ephemeris and clock corrections data, reference time data, reference location data, and a relationship between GPS time and time on the second control channel; and
10 performing the positioning fix using the acquired GPS assistance data.

83. A device in a wireless communication network, comprising:
a memory that stores instructions; and

a processor that executes the instructions to receive a request for assistance data from a mobile terminal tuned to a packet control channel, and transmit the assistance data to the mobile terminal via the packet control channel.

84. A method for acquiring Global Positioning System (GPS) assistance data in a mobile terminal tuned to a first control channel from which GPS assistance data is unavailable, comprising:

switching from the first control channel to a second control channel from which GPS assistance data is unavailable;

determining whether a preferred control channel, from which GPS assistance data is available, associated with the first control channel is in a list of control channels, from which GPS assistance data is available, associated with the second control channel;

finding a new preferred control channel from which GPS assistance data is available when the preferred control channel is not in the list; and

acquiring the GPS assistance data on the new preferred control channel.

85. The method of claim 84 further comprising:

returning to the second control channel after the acquiring.

86. A mobile terminal camped on a first control channel from which Global Positioning System (GPS) assistance data is unavailable, comprising:

a memory that stores instructions; and

a processor that executes the instructions to:

switch from the first control channel to a second control channel from which GPS assistance data is unavailable,

determine whether a preferred control channel, from which GPS assistance data is available, associated with the first control channel is in a list of control channels, from which GPS assistance data is available, associated with the second control channel,

find a new preferred control channel from which GPS assistance data is available when the preferred control channel is not in the list, and

acquire GPS assistance data on the new preferred control channel.

87. A device in a wireless communication network, comprising:

a memory that stores instructions and a Global Positioning System (GPS) time; and

a processor that executes the instructions to:

5 receive a request to measure time, the request comprising at least one of a non-packet control channel identity, a first flag indicating that one or more other non-packet control channels are to be measured, a packet control channel identity, and a second flag indicating that at least one other packet control channel is to be measured,

10 read, when the request comprises a non-packet control channel identity, time information on the identified non-packet control channel,

switch to each of the one or more other non-packet control channels when the request comprises the first flag,

read, after switching to a respective non-packet control channel, time information on the non-packet control channel,

15 switch to the identified packet control channel when the request comprises a packet control channel identity,

read, after switching to the identified packet control channel, time information on the identified packet control channel,

20 switch to each of the at least one other packet control channel when the request comprises the second flag,

read, after switching to a respective packet control channel, time information on the packet control channel, and

25 determine a relationship between the GPS time and the time information read from the identified non-packet control channel, the one or more other non-packet control channels, the identified packet channel, and the at least one other packet control channel.

88. The device of claim 87 wherein the request comprises a third flag indicating that a GPS time is to be determined,

wherein the processor determines a new GPS time in response to the request comprising the third flag, and

5 wherein, when determining a relationship between the GPS time and the time information read from the identified non-packet control channel, the one or more other non-packet control channels, the identified packet channel, and the at least one other packet control channel, the processor determines a relationship between the new GPS time and the time information read from the identified non-packet control channel, the one or more other non-

10 packet control channels, the identified packet channel, and the at least one other packet control channel.

89. A method for measuring time in a wireless communication network, comprising:
receiving a request to measure time, the request comprising one or more of a non-packet control channel identity, a first flag indicating that one or more non-packet control channels are to be measured, a packet control channel identity, and a second flag indicating that
5 at least one packet control channel is to be measured;
reading, when the request comprises a non-packet control channel identity, time information on the identified non-packet control channel;
switching to each of the one or more non-packet control channels when the request comprises the first flag;

10 reading, after switching to a respective non-packet control channel, time information on the respective non-packet control channel;
switching to the identified packet control channel when the request comprises a packet control channel identity;
reading, after switching to the identified packet control channel, time information
15 on the identified packet control channel;
switching to each of the at least one packet control channel when the request comprises the second flag;
reading, after switching to a respective packet control channel, time information on the packet control channel;

20 determining a relationship between the time read on each of the identified non-packet control channel, the one or more non-packet control channels, the identified packet control channel, and the at least one packet control channel and a Global Positioning System (GPS) time; and
transmitting the relationships.

90. The method of claim 89 wherein the request comprises a third flag indicating that GPS time is to be measured, and
wherein the method further comprises:
determining a new GPS time.

91. The method of claim 90 wherein the determining a relationship between the time read on each of the identified non-packet control channel, the one or more non-packet control channels, the identified packet control channel, and the at least one packet control channel and a GPS time comprises:

5 determining a relationship between the time read on each of the identified non-packet control channel, the one or more non-packet control channels, the identified packet control channel, and the at least one packet control channel and the new GPS time.

92. A computer-readable medium containing instructions for controlling at least one processor to perform a method for determining a relationship between time associated with control channels in a wireless communication network and a Global Positioning System (GPS) time, the method comprising:

5 receiving a request to determine time, the request identifying at least one packet control channel and at least one non-packet control channel;

 tuning to the identified at least one packet control channel;

 reading time information associated with the identified at least one packet control channel;

10 tuning to the identified at least one non-packet control channel;

 reading time information associated with the identified at least one non-packet control channel; and

 determining relationships between the GPS time and time information associated with the identified at least one packet control channel and the identified at least one non-packet control channel.

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